NOAA Fisheries
Pacific Islands Fisheries Science Center
Fiscal Year 2005 Annual Report

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July 2006

National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

PIFSC Mission

The mission of the PIFSC is to conduct high quality, timely research to support the stewardship of fisheries resources, protected species, and ecosystems in the central and western Pacific Ocean.

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Foreward

Welcome to this first annual report of the NOAA Fisheries' Pacific Islands Fisheries Science Center. As we enter our third year as a full-fledged Science Center, we take this opportunity to reflect on our research programs and directions and highlight our significant progress during the past fiscal year.

As the Pacific Islands Fisheries Science Center, we are carrying on a legacy of research in fisheries science, oceanography, and protected species recovery established by our predecessor, the Honolulu Laboratory. Yet, as a new Science Center, we are stretching to meet new challenges of the 21st Century.

The Center's research covers a wide range of scientific issues and topics requiring expertise in many disciplines. Our principal areas of research include coral reef ecosystems; ecosystems analysis and oceanography; fish biology and stock assessment; fisheries bycatch monitoring and mitigation; fisheries monitoring and socioeconomics; and protected species population monitoring and recovery. Support programs within the Center ensure success of our science endeavors by providing help in administration, information technology and communications, and scientific information services.

As you can see from the pictures throughout this report, we have a diverse and energetic staff. Our workforce of 175 includes 80 Federal employees, 75 employees of the University of Hawaii's Joint Institute for Marine and Atmospheric Research, and several external contractors. We operate three research facilities on the island of Oahu: our original Honolulu office building located on Dole Street adjacent to the University of Hawaii Manoa campus; our Kewalo Research Facility located on the Honolulu waterfront; and our new satellite office complex and laboratory for fish biology in Aiea, west of downtown Honolulu. In addition to our land-based operations, we engage in research expeditions year-around throughout the central and western Pacific on the NOAA Ship *Oscar Elton Sette* and other NOAA vessels and maintain extensive temporary field camps at remote islands and atolls in the Northwestern Hawaiian Islands.

As we have become a Science Center, the context in which we do our research has undergone significant changes. Some of the central changes are:

- an increased scope of responsibility, including expanded geographical range
- a stronger focus on ecosystem issues and perspectives
- new expectations for fish stock assessments, both domestically and internationally
- increased significance of oceanographic processes and ecosystem dynamics in population assessments
- new challenges in understanding cetacean populations in our region
- adapting to regulatory requirements for environmental impact documentation
- readiness to respond fully to litigation and other national policy matters
- continuing importance of understanding and accommodating the wide range of societal concerns and behaviors in relation to conservation and management issues
- importance of understanding and mitigating human interactions with protected species such as sea turtles, seabirds, and marine mammals and the bycatch of certain fish species, such as sharks

- emergence of new international arrangements for fisheries management and the increasing institutionalization of scientific advice
- issues of seafood quality and public health
- coordination with other NOAA offices; in particular, our partners in the NOAA Fisheries Pacific Islands Regional Office and the National Marine Sanctuary Program
- increased need for public education and outreach to make our research objectives, methods, and findings accessible to clients and constituents

The biggest change we have faced is simply the new institutional context for PIFSC itself, from being a satellite laboratory of a regional research center to a new, independent regional center with primary responsibility for NOAA Fisheries marine science across the entire span of the central and western Pacific.

We have an illustrious history and a great workforce eager to meet these challenges. As amply demonstrated in this report, our continuing scientific output is a testament to the dedication and professionalism of our scientists and able support staff. It is our pleasure to share this summary of their work with you.

We welcome your comments and thank you for your support.

Samuel G. Pooley, Ph. D.

Science Director

Michael P. Seki, Ph. D.

Deputy Science Director

Honolulu, Hawaii
July 2006

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Overview of the Center

Function and Mission

The Pacific Islands Fisheries Science Center (PIFSC) is one of six Science Centers in NOAA Fisheries. It was established in 2003 with the creation of the new Pacific Islands Region (PIR) within NOAA Fisheries. Headquartered in Honolulu, Hawaii, PIFSC is responsible for research on Federally-managed marine fisheries, protected species such as the endangered monk seal, and ecosystems in the entire western and central Pacific Ocean, in both near-island (insular) habitats and open ocean (pelagic) environments.

The Center's mission is to conduct high quality, timely scientific research to support conservation and management of living marine resources in the central and western Pacific Ocean. The PIFSC mission is linked directly to the NOAA Strategic Plan and, in particular, NOAA's Ecosystem Mission Goal:

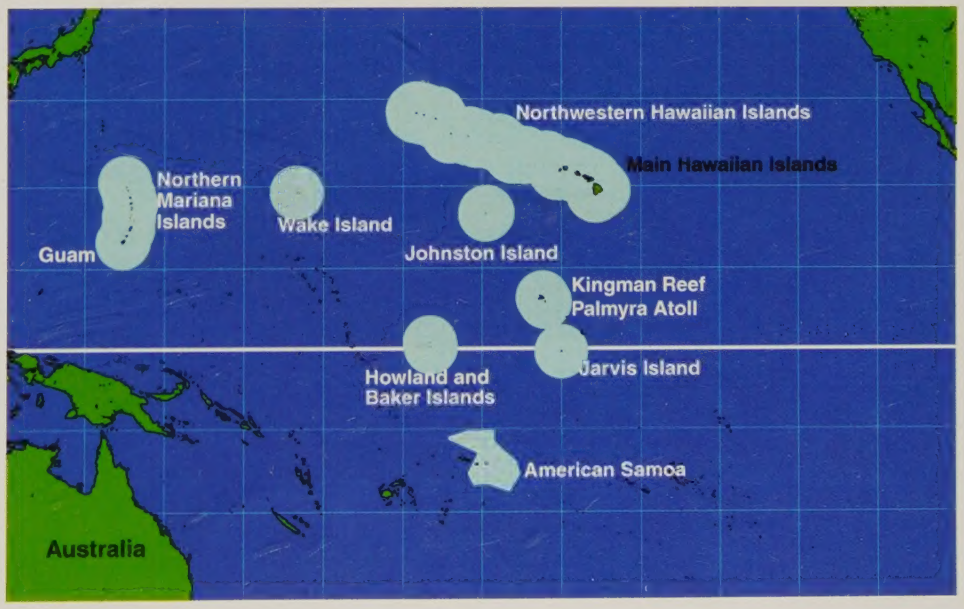
> "To protect, restore, and manage the use of coastal and ocean resources through an ecosystem approach to management."

In providing the science to support an ecosystems approach to the conservation, management and recovery of living marine resources, the PIFSC has adopted a comprehensive, multidisciplinary strategy. The strategy involves integrated marine resource and environmental monitoring and data collection, including an extensive ecosystem observation system, and scientific research programs with activities focused on near-shore and pelagic fisheries, coral reef species and habitats, marine mammals and sea turtles, and marine ecosystems and oceanography.

The Center's fisheries-oriented research programs monitor U.S. fisheries throughout the Pacific Islands Region and conduct biological, ecological, and economic research in support of five fishery management plans established by the Western Pacific Fishery Management Council and international treaties for the management of tuna. Coral reef research focuses on comprehensive surveys of reef ecosystems in the archipelagoes of the PIR. Protected species research and recovery programs monitor the status of the Hawaiian monk seal and sea turtles in the Pacific and identify the factors affecting their population health and recovery. A new component of the Protected Species program is focused on surveys of cetacean populations in the central Pacific. Other PIFSC research investigates the structure and dynamics of central North Pacific marine ecosystems and how marine populations are affected by changes in their predators, prey, and habitat, and by ocean climate.

History

PIFSC has a long and illustrious history. The initial staff and facilities of PIFSC derived from the former Honolulu Laboratory, until 2003 a component of the NOAA Fisheries



Southwest Fisheries Science Center in California. Before NOAA's establishment in 1970, the Honolulu Laboratory was part of the U.S. Fish and Wildlife Service, originating in 1948 as the Pacific Oceanic Fishery Investigations (POFI). In almost six decades of scientific studies, PIFSC staff and their predecessors have engaged in fishery resource exploration, fisheries development, fisheries biology and ecology, protected species recovery research and conservation, and oceanographic research throughout the Pacific and as far away as the Indian Ocean. More recently, PIFSC has established extensive programs in coral reef ecology. The PIFSC continues to provide scientific information and expertise in support of living marine resource management throughout the central and western Pacific.

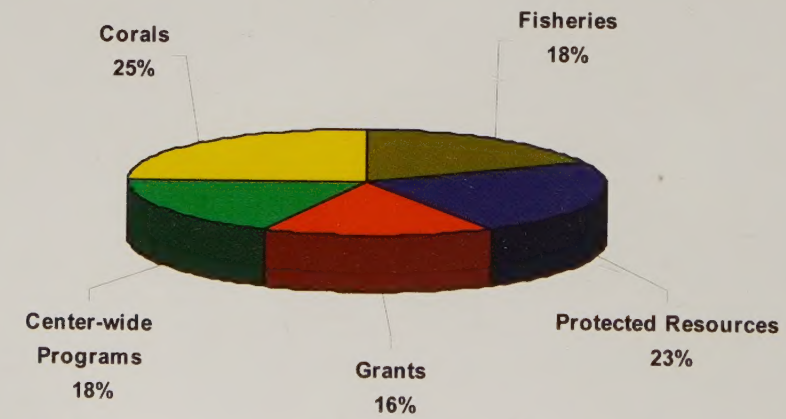
Pacific Islands Fisheries Science Center

Geographic Area of Responsibility

Bounded by the Hawaiian Archipelago in the north, American Samoa and U. S. Pacific remote island areas in the south, and the Marianas Archipelago in the west, the Pacific Islands Region encompasses the largest geographical area within NOAA Fisheries' jurisdiction. The U. S. Exclusive Economic Zone (EEZ) within the Region includes more than 1.7 million square nautical miles of ocean, roughly equal to the total EEZ of the continental U. S. and Alaska.

Budget and Staffing

In fiscal year (FY) 2005, the PIFSC budget was $23.2M and supported a staff of more than 175 researchers, technical personnel, and administrative employees. Almost all of the Science Center's budget supports the NOAA "ecosystems" mission and its activities generally fall within the NOAA Ecosystems Observation Program (ca. 75% of the budget) and Corals Program (ca. 25%). About 50% of PIFSC staff are federal employees and the rest include employees of the University of Hawaii (UH), Joint Institute for Marine and Atmospheric Research (JIMAR), and Aquatic Farms. Several UH students are also employed at the Center or are engaged in research here.



PIFSC FY 2005 Budget

Facilities and Vessels

The main PIFSC office facility is located on the University of Hawaii at Manoa campus. A smaller research and office facility at Kewalo Basin, on the Honolulu waterfront, has a seawater system enabling research on live, large pelagic fishes, monk seals, and sea turtles. Another research facility, with offices and a wet laboratory supporting fish biology work, is leased at the Hawaii Agricultural Research Center in Aiea (HARC).

The NOAA Ship *Oscar Elton Sette*, home-ported in Honolulu, is the primary research vessel supporting the Science Center's extensive field activities. Center staff also conduct benthic habitat mapping and other research aboard the NOAA Ship *Hi'ialakai* in partnership with NOAA's National Ocean Service (NOS).

Research Focus

PIFSC research currently focuses on several areas of high priority:

- Monitoring and reducing fishery interactions with protected species

- Monitoring the status of Hawaiian monk seals and finding ways to increase their survival rates and population sustainability
- Monitoring the status of Hawaiian green turtles and other marine turtle populations in the Pacific Islands Region
- Assessing cetacean populations and the impacts of human activity on them
- Mitigating fisheries bycatch, particularly in multi-national pelagic longline fisheries
- Providing scientific advice in support of international and domestic management of fisheries for highly migratory species (HMS)—including tunas, billfishes, and sharks
- Assessing lobster populations in the Northwestern Hawaiian Islands and bottomfish populations in the Hawaiian Archipelago
- Assessing stocks of tunas, billfishes, and other pelagic fishes in the central and western Pacific

Kewalo Research Facility

- Researching the use of barbless hooks by recreational fishers to reduce post-release fish mortality and risks of injury to protected species
- Expanding the understanding of socioeconomic and cultural aspects of living marine resource use and appreciation throughout the Pacific Islands Region
- Identifying and understanding the effects of ecosystem linkages and environmental processes on fish stocks, protected species, and other marine life and developing the scientific basis for ecosystem oriented management
- Assessing the physical and biological structure, dynamics, and health of coral reef ecosystems
- Monitoring and removing derelict fishing gear and other marine debris from reefs and nearshore waters of the Hawaiian Archipelago

Science Center Organization

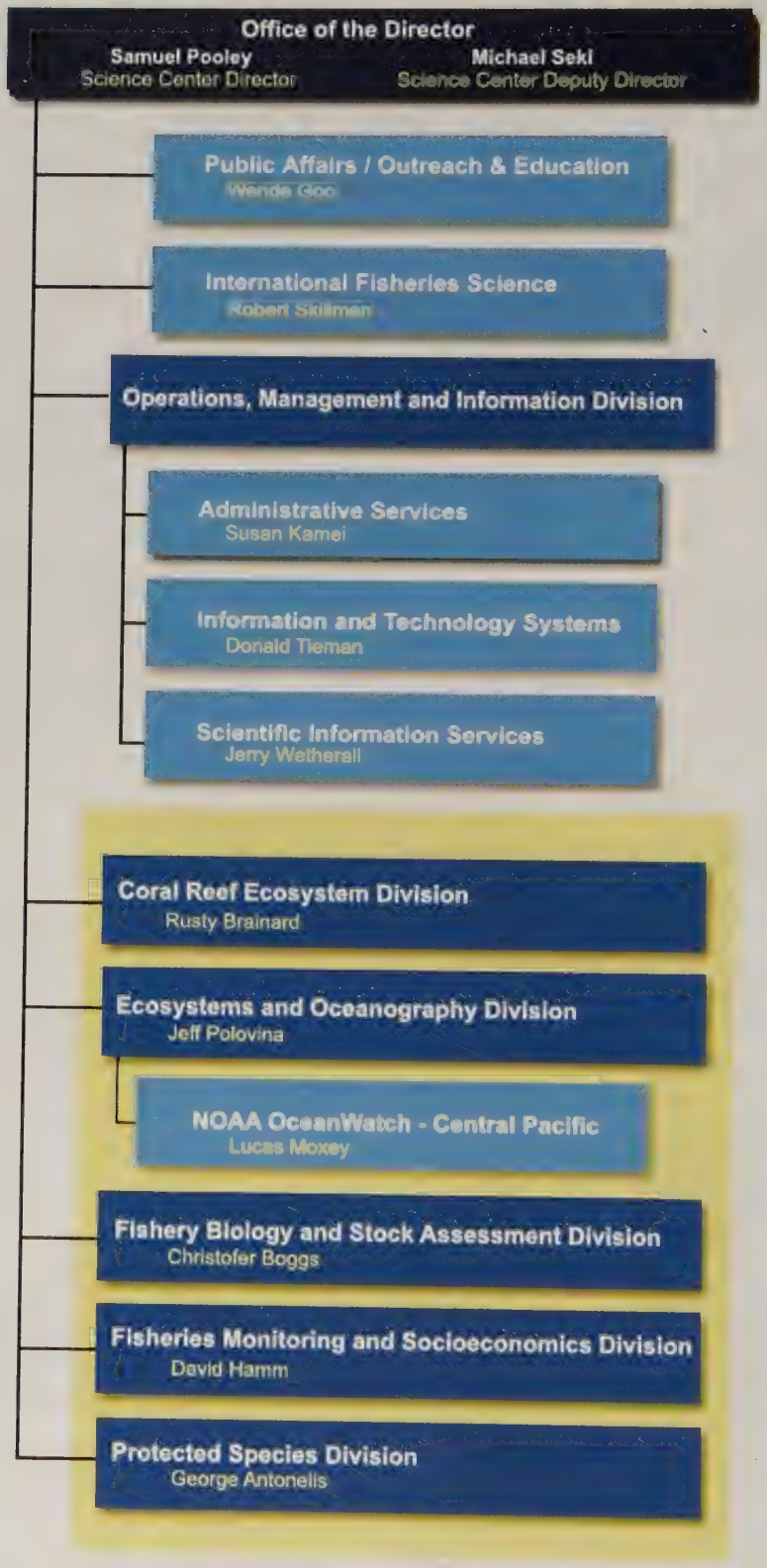
Scientific programs of the PIFSC are planned and carried out by five research divisions:

- Coral Reef Ecosystem Division (CRED)
- Ecosystems and Oceanography Division (EOD)
- Fishery Biology and Stock Assessment Division (FBSAD)
- Fisheries Monitoring and Socioeconomics Division (FMSD)
- Protected Species Division (PSD)

Although each research division focuses on different aspects of the PIFSC mission, many projects involve a significant degree of inter-divisional cooperation and scientific collaboration.

Comprehensive technical and administrative support for research programs is provided by the Operations, Management and Information Division (OMID).

NOAA Ship *Oscar Elton Sette*



Pacific Islands Fisheries Science Center Organization Chart

Director's Office

The Director's Office provides overall scientific leadership, strategic guidance, research direction, program management, and operational policy for the Science Center. In addition, the office is responsible for liaison with our many partnering agencies and offices, including NOAA Fisheries' Pacific Islands Regional Office (PIRO) and other NOAA offices locally and nationally, the Western Pacific Fishery Management Council, the State of Hawaii, the University of Hawaii, the U.S. Fish and Wildlife Service, and Congressional staff offices, among others. The Director's Office provides coordination and leadership for U.S. participation in international scientific committees and commissions in the Pacific. The Director's Office also manages the Center's planning and budget functions, facilities, and outreach and public affairs.

Planning and Program Coordination

Many of the center-wide planning and program coordination activities are implemented from the Director's Office to ensure responsiveness to and consistency with the NOAA and NOAA Fisheries Strategic Plans. These activities include:

- Generation of current and projected 'Annual and Program Operating and Spending Plans'
- Center-wide budget formulation and requests
- Research program oversight, coordination, and integration
- Strategic planning and input to the NOAA Program Planning and Budget Execution System (PPBES)
- Establishment and tracking of performance measures and milestones
- Ensuring National Environmental Policy Act (NEPA) compliance for PIFSC research
- Coordination of PIFSC efforts to support the Integrated Ocean Observing System (IOOS)
- NOAA research vessel operations and scheduling coordination

Outreach and Public Affairs

The community outreach program serves as the focus for the communication of scientific programs with outside agencies and the public. The objective of the program is to seek and create opportunities to inform and educate the public about the Center's mission and its impact on the economy and environment in the Pacific. This is accomplished by:

- Raising the awareness of the general public to gain support for the programs of the Pacific Islands Fisheries Science Center
- Educating young people to become stewards of the environment
- Establishing the Pacific Islands Fisheries Science Center as a resource for the community and networking with community groups, schools, and other organizations
- Promoting careers in ocean sciences
- Helping teachers develop a science and conservation curriculum that supports the objectives of the Pacific Islands Fisheries Science Center

Director's Office staff

The program also designs educational resources and implements strategies to increase communications and understanding between the agency, our constituents and the general public.

International Fisheries Science

The International Fisheries Office (IFO) represents the science and fishery statistics interests of the Pacific Islands Region at meetings of the Western and Central Pacific Fisheries Commission (WCPFC) and the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) and provides scientific advice and support to PIRO, the U.S. State Department, and other members of official U.S. delegations to such meetings. In particular, the IFO coordinates the preparation of scientific reports, data summaries, and other information products as requested by the PIRO and the State Department in connection with international meetings related to highly migratory species (HMS) and leads the U.S. delegation to meetings of the WCPFC Scientific Committee. The IFO oversees the compilation of official statistics for U.S. HMS fisheries in the Pacific Islands Region and, as the U.S. data correspondent, submits all official U.S. HMS fishery statistics to the WCPFC. The IFO also facilitates communication between the Center and international organizations regarding collaborative research, fishery monitoring, official document submission, and related matters.

Operations, Management and Information Division
Administrative Services

The Office of Administration provides a comprehensive range of services in support of the Center's mission and staff. Areas covered include budget, EEO, grants, procurement, and safety training.

The Center's budget staff provides advice and technical assistance in the preparation of division budget plans and the execution of the plans. Plans are examined for completeness, accuracy, and conformance with established procedures, regulations, and organizational objectives and are consolidated for Center submission to Headquarters. The budget staff also develops guidelines and policies governing the maintenance of the budget, measures organizational performance, and assesses the effects of various programs and policies on the budget. The budget staff provides training to division staff on the execution of the budget and the use of the Fisheries' Financial Reporting System.

The Pacific Islands Fisheries Science Center manages several grants and cooperative agreements supporting research and related activities in the areas of protected species, coral reefs, fisheries, oceanography, aquaculture, and other areas of research critical to the NOAA mission.

PIFSC administration also coordinates and tracks training and development activities for Center managers and staff, including guidance and training on EEO. The Office of Administration sponsors several activities to encourage diversity in the workplace, including training seminars, brown bag luncheons, internship opportunities, and educational poster displays.

The procurement staff helps Center employees obtain services, supplies, and equipment needed to meet program requirements and achieve operational goals. The staff strives for timely processing of invoices to ensure prompt payment of contractors and vendors and ensures that all accounting data related to each transaction are accurate and that needed corrections are made in a timely manner. The administrative staff actively monitors the status of facilities and coordinates with the Safety Officer and the Executive Officer to identify needed repairs or improvements, determine costs, and ensure job completion. The procurement staff monitors the Center's equipment inventory to ensure that newly purchased property items are entered and accurately accounted for.

The Safety and Environmental Compliance program is responsible for ensuring that PIFSC programs and activities follow federal rules and regulations designed to prevent injury to employees and adverse impacts to the environment. The program involves facility compliance inspections, training, and behavioral changes to reduce injuries and adverse impacts to the environment. The facilities program is responsible for recording and reporting material deficiencies in PIFSC facilities to NMFS facility program managers and for ensuring facility maintenance.

The small boat program is responsible for ensuring the PIFSC is in compliance with NOAA boating policies, including the Management of NOAA Small Boats and NOAA Marine and Aviation Operations (NAO 217-103) policies related to boats and skiffs. The small boat program maintains and updates the PIFSC vessel policy, conducts boat and water safety training, and manages the PIFSC small boat fleet. The program coordinates with Center research divisions conducting boating operations and provides assistance and guidance to them on boating and safety issues.

Administrative Services staff

Operations, Management and Information Division
Information and Technology Systems

The Information and Technology Systems (ITS) group provides IT support to all Pacific Islands Fisheries Science Center staff including people located at the Kewalo Basin Research Facility and the HARC fish biology laboratory. ITS system administrators maintain and upgrade computer hardware, software, and infrastructure and ensure compliance with IT security requirements. The ITS system design team assists with the design and development of data systems to meet needs of users in all Center divisions and programs.

System Administrators

The ITS system administrators had a very successful year. We were able to: upgrade all of our Windows servers to MS Windows 2003; implement Virtual Private Network (VPN) for authorized Center staff; and implement Windows Server Update Services (WSUS) to reduce the amount of time required to "push" software upgrades to networked computer systems. We integrated the new facility at HARC into our network; implemented an SSL certificate system to provide secure communications to sensitive applications; updated wiring, switches and routers throughout the Center; installed a remote camera system to monitor captive sea turtles at the Kewalo Basin facility; and upgraded references on our servers to reflect our status as the Pacific Islands Fisheries Science Center.

ITS System Administrators

System Design Team

The ITS system design team has spent much of this year completing the development, testing, and documentation of the *InPort* metadata registration application.

InPort was originally conceived as a tool for managing PIFSC information about our organization, projects, data, publications and other information products. A successful request for funding from the Fisheries Information System (FIS) expanded the scope of the application to include comprehensive metadata registration for fishery-dependent data at all NMFS locations. In addition to *InPort* work, the design team continues to assist the Pacific Islands Regional staff office with needed refinements to the Hawaii Longline Observer Data System and has worked to port this system to both the SWFSC and NEFSC with funding provided by FIS.

ITS System Design Team

Operations, Management and Information Division
Scientific Information Services

The Scientific Information Services (SIS) group provides comprehensive support to the Pacific Islands Fisheries Science Center in the management and dissemination of scientific information collected, acquired, or produced by Center programs.

SIS handles many kinds of information, including fisheries data, scientific publications, educational materials, graphics, and library resources, and also manages the Center's Web presence.

SIS data management staff carefully screen, validate, and archive catch statistics and other information provided to NMFS by commercial fishing vessel captains or collected by the Center's fisheries research programs. SIS maintains extensive metadata about the Center's holdings of fishery statistics and fishery research survey data and provides full access to the data for statistical analyses, stock assessment studies, and fishery reports while meeting legal requirements to protect the confidentiality of commercial fishing enterprises.

SIS publications specialists carefully examine and edit reports, manuscripts, and other documents prepared by Center scientists to ensure they meet a high standard of quality before they are released to the public or submitted for publication in peer-reviewed journals.

SIS helps Center staff with graphical design and layout, photography, digital image processing, poster production, and other graphics needs.

SIS manages a NOAA reference library for use by Center scientists and the public. The library has extensive up-to-date collections of scientific journals and technical books on fisheries science, oceanography, marine ecology, conservation biology, and other subjects with an emphasis on Pacific Island insular and oceanic ecosystems.

SIS is responsible for developing and maintaining the PIFSC Web site, in collaboration with subject matter experts in the Center's research divisions, and for disseminating the Center's scientific reports, public data products, news on current research activities and other information over the Internet.

SIS also manages the PIFSC Intranet, providing Center staff with comprehensive information about administrative support resources; policies and procedures; reports of current Center research activities; NOAA and NMFS corporate news; announcements of upcoming meetings, seminars, and other events; and more.

As a diverse information support group, SIS aims to ensure that marine resource managers, research colleagues, and the public have ready and timely access to important data products and the research findings of Center scientists.

Scientific Information Services staff

Research
Coral Reef Ecosystem Division

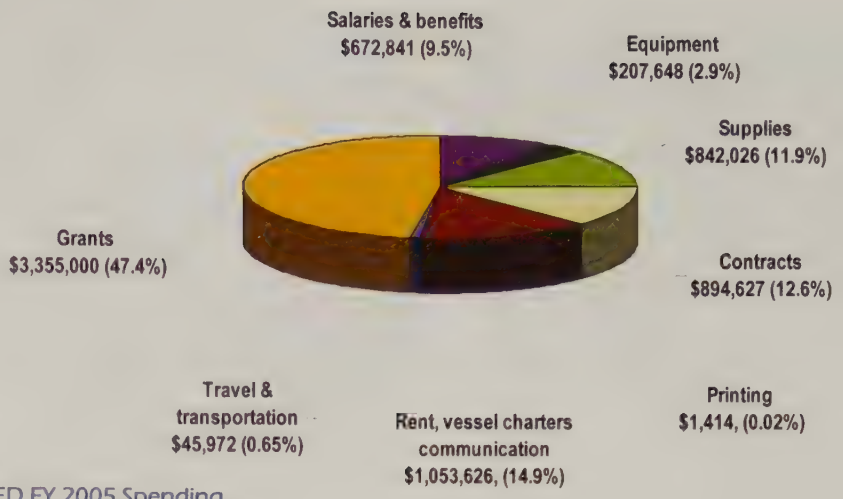
The Coral Reef Ecosystem Division (CRED) conducts integrated, multidisciplinary, ecosystem research, habitat mapping, and long-term monitoring of coral reef ecosystems in the U.S.-affiliated Pacific Islands. CRED's work is a key component of NOAA's Coral Reef Conservation Program (CRCP) and the Coral Reef Ecosystem Integrated Observing System (CREIOS). Coral reefs, long valued for their economic, scientific, recreational, and other benefits are under increasing threat from natural and human-caused stressors. Conservation and protection of U.S. coral reef ecosystems are mandated by the Coral Reef Conservation Act of 2000 and the Coral Reef Protection Executive Order #13089 of 1998. The CRCP was established to support effective management and to ensure the sound science needed to preserve, restore, and sustain valuable coral reef ecosystems. Working closely with numerous federal, state, and territorial agencies and nongovernmental organizations, CRED scientists describe, map, and monitor coral reef ecosystems in the main Hawaiian Islands, the Northwestern Hawaiian Islands (NWHI), the Territories of Guam and American Samoa, the Commonwealth of the Northern Mariana Islands, and the Pacific Remote Island Areas (PRIAs). The program's approach is to apply a suite of standardized methods—including ecological assessments, oceanographic measurements, benthic habitat mapping, and marine debris removal—to improve understanding of the processes influencing the health of coral reef ecosystems throughout the region. The knowledge gained is shared with resource managers and various public stakeholders to improve decision-making for the long-term conservation and management of coral reef resources.

Coral Reef Ecosystem Division staff

The CRED is organized into five focus areas:

- The *Oceanography Group* observes and monitors key oceanographic processes and water quality conditions using in situ observations collected from NOAA ships and small boats, surface and sub-surface moored instrument arrays, and satellite-tracked drifter buoys; data collected by satellite-borne remote sensors; and oceanographic models.
- The *Ecological Monitoring Group* conducts Rapid Ecological Assessments (REAs), which quantitatively and qualitatively document the spatial distribution, density, species composition, and sizes of corals, other macro-invertebrates, fish, and algae observed during sample surveys. The REAs use several complementary and overlapping methods: stationary point counts, roving diver surveys, belt transect surveys, photo quadrats, video transects, and specimen sample collection.
- The *Benthic Habitat Mapping Group* uses single- and multi-beam echo sounders deployed on NOAA research vessels to map the depth and character of the sea bottom. Towed cameras, remotely operated vehicles, and laser line scan systems also are used to collect video and photographic data that validate the interpretations of the seafloor character derived from the acoustic data.
- The *Marine Debris Team* uses both towed diver and swim surveys to assess accumulations of derelict fishing gear and other marine debris. Marine debris divers and snorkelers manually remove marine debris from the reefs and, on some occasions, from entangled protected species.

CRED has a total of 48 staff members including 6 federal employees and 42 employees of the University of Hawaii's Joint Institute for Marine and Atmospheric Research (JIMAR), funded by NOAA. Grants—primarily to JIMAR—account for the largest CRED expenditure, as shown in the graph.



CRED FY 2005 Spending

Key FY 2005 Accomplishments

- The Marine Debris Team and the U.S. Coast Guard, as part of a multiagency project, removed 57 tons of derelict fishing gear from the Northwestern Hawaiian Islands. This completed a 5-year, large-scale survey which removed debris from many reefs in the Northwestern Hawaiian Islands. In 2006, "maintenance mode" debris removal operations will continue at targeted high-priority areas.

- In 2003, at the request of the U.S. Navy and the Military Sealift Command (MSC), CRED collected and analyzed extensive multi-beam data to characterize benthic habitat in Saipan's Garapan anchorage. In FY 2005, CRED scientists responded to a similar MSC request and returned to Saipan to collect 123 linear km of additional video validation data. A final report "Characterization of Benthic Habitat for Saipan Anchorage, Commonwealth of the Northern Mariana Islands" was presented to the U.S. Navy and MSC in June 2005.

- Multi-beam mapping operations using two new sonars on the NOAA Ship *Hi'ialakai* were initiated in FY 2005. In 138 days of operations using the *Hi'ialakai* and the 25-ft survey launch *AHI*, approximately 3000 km^2 of seafloor were surveyed. Major surveys were conducted at French Frigate Shoals, Maro Reef, Pearl and Hermes Atoll, and Kure Island in the NWHI, and at Ni'ihau and Penguin Bank in the main Hawaiian Islands.

- Accurate delineation of 25-, 50-, and 100-fm isobaths was accomplished by the mapping team, fulfilling an important management information need of the new NWHI National Marine Monument.

- CRED led the first Reef Assessment and Monitoring Project (RAMP) cruises in the main Hawaiian Islands aboard the NOAA Ships *Oscar Elton Sette* and *Hi'ialakai*.

- CRED led a RAMP cruise to the Commonwealth of the Northern Mariana Islands (CNMI) and Guam, and the first ever Rapid Ecological Assessment (REA) survey at Wake Atoll. This cruise was conducted in partnership with the University of Guam Marine Laboratory, the CNMI Division of Fish and Wildlife, the CNMI Division of Environmental Quality, CNMI Coastal Resources Management, the U.S. Army, and the Guam Division of Aquatic and Wildlife Resources.

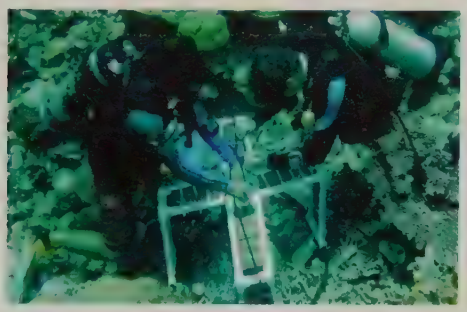
- During the work at Wake Island, the Oceanography Group deployed subsurface temperature recorders to be recovered on the next RAMP cruise to Wake Island. These recorders will collect high resolution in situ temperature data. In addition, a sea surface temperature buoy was deployed at Wake Island; it will transmit hourly temperature data back to the Pacific Islands Fisheries Science Center.

- A bottomfish camera bait station (BOTCAM) underwent field trials aboard the *Oscar Elton Sette* and successfully obtained data during 35 deployments in the western Pacific.

- CRED published a series of manuscripts on scientific topics ranging from fisheries to algae and coral bleaching.

Challenges, Problems, Limitations

The success of CRED's field programs depends on access to NOAA ships and other research vessels equipped for the work. CRED projects require



CRED divers place coral settlement plates on the seafloor to monitor coral recruitment

over 200 vessel days per year on a variety of vessels traveling to very remote areas. The logistics of obtaining vessel time, scheduling cruises, and organizing staff and crew are significant. In addition, the CRED needs to acquire specialist staff with expertise in data management and integration, ecosystem and oceanographic modeling, spatial statistics, and invertebrate biology.

Future Focus and Direction

A significant change in CRED's program will occur in FY 2006 when the marine debris program ceases large-scale removal activities in the NWHI. The program will focus on smaller-scale debris removals in designated NWHI habitats and a new survey and removal program in the main Hawaiian Islands. This downsizing of the marine debris component will reduce CRED's budget appreciably. To secure additional funding, CRED has submitted proposals to Ocean Exploration and the Center for Sponsored Coastal Ocean Research, including a proposal for a comprehensive coral reef study in American Samoa and a proposal for a laser line scan study off Maui in the main Hawaiian Islands. If funded, these proposals would increase the scope and size of the mapping and ecological monitoring programs.

Divers remove derelict fishing gear from coral reef habitat

Research

Fishery Biology and Stock Assessment Division

The Fishery Biology and Stock Assessment Division (FBSAD) conducts fundamental biological and ecological research on fish and crustaceans caught in federally managed fisheries to enable improved understanding of the mechanisms that influence their distribution and abundance. Life history studies on age and growth, reproduction and fecundity, migration and movement, and mortality are conducted to provide vital rates statistics for stock assessments and ecosystem approaches to management. Research is focused on tunas, billfishes and other pelagic species; bottomfish; and NWHI lobster. Attention is also being directed toward coral reef species. The research involves field surveys using a variety of sampling gears, laboratory studies of biological specimens, and analysis of data from tag and recapture experiments using conventional, archival, and pop-up archival tags. New fishing technologies are developed, tested, and promoted internationally to reduce bycatch and the impacts of pelagic longline fisheries on populations of sea turtles, seabirds, sharks, and other species caught incidentally. The ecology of exploited stocks and the effects of stock levels, harvests, and bycatch on the broader ecosystem are explored through food web analyses and ecosystem models. Stock assessments and estimates of bycatch of sea turtles, seabirds, and marine mammals are provided in support of the NOAA Fisheries Pacific Islands Regional Office (PIRO), the Western Pacific Regional Fishery Management Council (the Council), and international organizations such as the Western and Central Pacific Fisheries Commission (WCPFC), the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC) and the Inter-American Tropical Tuna Commission (IATTC). Stock assessments are currently conducted for tunas, billfishes, pelagic sharks, bottomfishes, and lobsters.

The FBSAD is organized into three programs:

- The Fish Biology and Bycatch Program primarily focuses on identifying methods, including modifications to fishing gear and bait and associated outreach and education programs, to minimize the incidental capture of sea turtles and other bycatch species in pelagic longline fisheries. This program also conducts research on pelagic fish ecology.

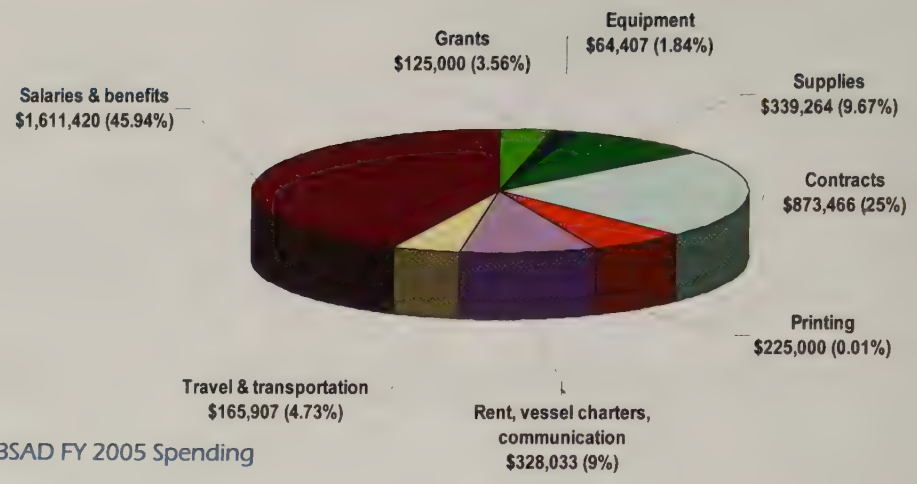
- The Stock Assessment Program conducts population assessments of pelagic species, including yellowfin and bigeye tunas in the western and central Pacific and swordfish, striped marlin, and blue shark in the North Pacific. Assessments are also produced for insular species including Hawaiian Archipelago bottomfish, Northwestern Hawaiian Islands lobster, and coral reef species in various

Fishery Biology and Stock Assessment Division staff

Pacific island locales. The program also estimates incidental takes of sea turtles, seabirds, and marine mammals in the Hawaii longline fishery.

- The Life History Program conducts basic research on the age and growth characteristics of managed fish stocks.

FBSAD has a staff of 23 people, including 17 federal employees and 6 employees of JIMAR or other nonfederal entities. The graph shows the allocation of expenditures across cost categories. Staff salaries and benefits made up the largest share of expenditures in FY 2005.



FBSAD FY 2005 Spending

Key FY 2005 Accomplishments

- Provided a special report to the Council that summarized seabird take rates by deep- and shallow-set longline gear, by area. This analysis supported a Council need to consider alternative boundaries as means to reduce seabird bycatch in deep- and shallow-set longline gear.

- Launched experiments under the auspices of the Japan-Hawaii Sea Turtle and Seabird Experiment (JHSTSE) to examine the efficacy of different hook designs in minimizing seabird bycatch in pelagic longline fisheries. Tests of circle hooks are being carried out on fishing trips by more than a dozen Hawaii-based tuna longline vessels and on two research cruises by Japanese vessels.

- Computed estimates of the incidental takes of sea turtles, seabirds, and marine mammals in the Hawaii longline fishery using longline logbook and observer data. These estimates were used, in part, in drafting the Biological Opinion on the longline fishery.

- Started a program to extend longline gear testing and sea turtle handling workshops to Latin American nations and establish similar efforts in other Pacific fishing nations. Hosted an international Technical Assistance Workshop to develop several new projects, leading to contracts with researchers in Italy, Spain, and Brazil, and with the World Wildlife Fund for projects they are conducting in Indonesia, Papua New Guinea, and Vietnam. New collaborations are also underway in Mexico, the Philippines, and Australia.

- Published articles in the peer-reviewed literature. Included were four papers on the experiments being conducted to investigate the physiological and behavioral basis for sea turtle attraction to fishing gear and two papers on the experiments to test promising gear modifications for reducing sea turtle bycatch in longline fisheries, and to estimate their efficacy.

- Began collaboration with scientists from Japan's National Research Institute for Far Seas Fisheries (NRIFSF) and the Inter-American Tropical Tuna Commission (IATTC) to conduct a stock assessment on striped marlin in the North Pacific.

- Prepared for peer review a spatially explicit assessment

PIFSC scientists record biological data during the annual NWHI lobster resource survey

model for Northwestern Hawaiian Islands spiny lobster resources.

Challenges, Problems, Limitations

Although work on bycatch issues, particularly sea turtle bycatch, continues to receive steady funding, budget constraints have made it challenging to adequately support needed work on the ecology and stock assessment of managed fishery target species such as tuna and bottomfish, and coral reef species. Resources for such work are being sought from the national Stock Assessment Improvement Program (SAIP). The program is also challenged with developing and coordinating the integrated research programs needed to support ecosystem approaches to management of living marine resources.

Future Focus and Direction

Many of the projects featuring accomplishments in FY 2005 will continue into FY 2006, including: the bycatch experiments under the auspices of JHSTSE; various stock assessments; and the program to extend longline gear testing and handling workshops to include more Latin American nations and establish similar efforts in other Pacific fishing nations. In addition, a new process for rigorous peer-review of stock assessments will be implemented to enhance the quality of these scientific work products. To support expanding research needs, the Division plans to recruit seven additional staff members in the near term.

Measuring a swordfish on the NOAA Ship *Oscar Elton Sette*

Research

Ecosystems and Oceanography Division

The Ecosystems and Oceanography Division (EOD) conducts research to advance our understanding of the structure and dynamics of Pacific basin marine ecosystems. In particular, EOD seeks to understand how marine populations change directly in response to changes in their predators and prey and indirectly due to broader habitat-based changes in the ocean climate, including El Niño, La Niña, and other interannual or decadal events.

EOD research covers many different scales ranging from fine-scale habitat characterization to basin-scale oceanography, and from short-term individual foraging behavior to long-term ecosystem changes and population trends. Accordingly, a variety of approaches are necessary, including interdivisional, multi-agency, academic, industry, NGO, and multinational collaborations.

The EOD has three major research themes:

- Insular Habitat and Ecology focuses on understanding the dynamics of island-associated species and processes.
- Pelagic Habitat and Ecology considers the ocean from the perspective of large pelagic animals.
- Ecosystem Oceanography identifies changes in the ocean that may affect the marine ecosystem.

EOD provides scientific advice towards improved stock assessment and fisheries management, develops indicators of ecosystem changes, and publishes scientific findings related to habitat/environmental effects on individuals, populations, ecosystems, and fisheries. To accomplish these goals, EOD researchers use a variety of platforms including deep diving submersibles, remotely operated vehicles, and SCUBA, both small and large research vessels and commercial vessels. EOD employs a broad spectrum of advanced technologies and tools including pop-up satellite archival tags, animal-borne instruments such as CRITTERCAM, shipboard and moored echo sounders, satellite remotely-sensed oceanographic and atmospheric data products, ocean circulation models, and ecosystem models.

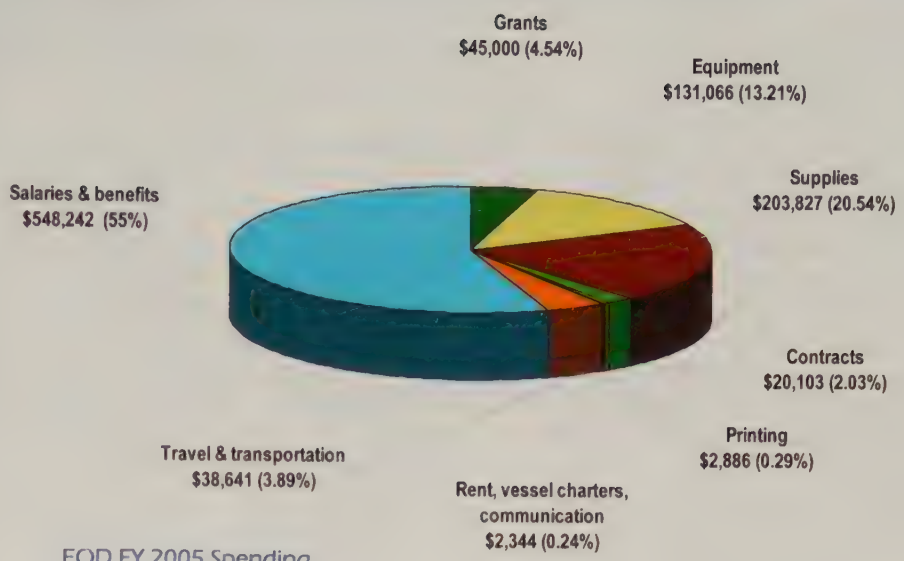
EOD has 8 staff, including 6 federal employees and 2 JIMAR employees. The graph shows the distribution of FY 2005 expenditures across cost categories. Salaries and benefits made up the largest share of expenditures.

Key FY 2005 Accomplishments

- Submitted two manuscripts to peer-reviewed journals on topics related to monk seal foraging ecology: the abundance of monk seal prey relative to ecological depth zones of the Northwestern Hawaiian Islands; and the association of subphotic fish assemblages with precious corals.

Ecosystems and Oceanography Division staff

- Prepared the Pacific Islands section of NOAA's National Deep Sea Coral Report.
- Completed a paper (in press) on identification of the Kuroshio Extension Bifurcation region as a mid-ocean hotspot for juvenile loggerhead sea turtles (in collaboration with G. Balazs, Pacific Islands Fisheries Science Center).
- Completed a paper (in press) describing the high catches of bigeye tuna at Palmyra Atoll in response to El Niño.
- Published results of collaborative research with Australian scientists using pop-up archival transmitting (PAT) tags to describe movements of whale sharks.
- Estimated cetacean injuries and mortalities in the Hawaii longline fishery using observer and logbook data (collaboration with K. Forney, Southwest Fisheries Science Center).
- Deployed two acoustic recording devices, one at Cross Seamount and another at Palmyra Atoll, to describe the temporal dynamics of cetaceans at these locations (a collaboration with D. Johnston, Pacific Islands Fisheries Science Center).
- Analyzed oceanographic data to identify relationships between the location of the Transition Zone Chlorophyll Front (TZCF) and monk seal pup survival in the northern NWHI atolls.



EOD FY 2005 Spending

- Used satellite and ocean circulation model data to show that larvae from Johnston Atoll could routinely be advected to the middle of the Hawaiian Archipelago, explaining some of the observed species that the two regions have in common.

Challenges, Problems, Limitations

In 2005, we began conducting acoustic surveys of tunas and their forage and have encountered a problem with noise contamination in the acoustic data collected onboard the NOAA Ship *Oscar Elton Sette*. Resolving this problem is a high priority. Another emerging issue is that our extensive use of passive and active acoustic tools, satellite remotely sensed data, and coupled physical-biological ocean models all result in very large data sets. Storing and handling these large data sets are a challenge.

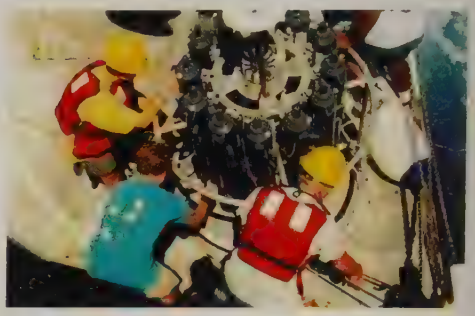
Future Directions

The EOD expects to expand research on deep sea corals. The Division is already studying precious coral and black coral throughout the Hawaiian Archipelago and exploring their distributions in the Line Islands. EOD will likely extend the deep sea coral surveys to the western Pacific and expand research on their distribution, growth, and ecology. The Division also plans to continue

Preparing to tag an albacore on a cooperating commercial fishing vessel

active acoustics work with both juvenile snappers and pelagic species. Pelagic fisheries oceanography work will continue with further analyses of pelagic fisheries, environmental, and tagging data in the Hawaii longline fishing grounds and with an extensive oceanographic survey of the American Samoa longline grounds. In 2006, we will also recover our two passive acoustics recorders from Cross Seamount and Palmyra Atoll and will be able to evaluate the contributions this technology will provide to our cetacean distribution studies.

In 2006 we will further explore coupled ocean and ecosystem models that offer the potential to advance our understanding of ecosystem dynamics and develop ecosystem forecasts. Lastly, an area that may receive further attention in the near future is Palmyra Atoll. This area appears to be a hotspot for several species, including tunas, leatherback turtles, and cetaceans and is thus a prime candidate for fruitful ecosystem research.



Oceanographers deploy instruments to measure characteristics of the marine environment

Research

Fisheries Monitoring and Socioeconomics Division

The Fisheries Monitoring and Socioeconomics Division (FMSD) specializes in the collection, management, and analysis of data from U.S. fisheries in the Pacific Islands Region.

The FMSD's mission is multifaceted, and includes monitoring and reporting of fisheries-dependent data; providing technical support to PIFSC partner agencies in Hawaii, American Samoa, Guam, and the Northern Mariana Islands in developing and administering local fishery monitoring programs; and conducting social and economic research on marine resource use in the Pacific Islands Region. The fishery-dependent data collected, processed, and analyzed by FMSD, and products derived from them, comprise most of the information requests received by FMSD from fishery scientists and managers and are the foundation of many key fisheries management decisions. Likewise, the socioeconomic data and related research undertaken by FMSD support fishery management decision by providing valuable insights into the effects of those decisions on fishery participants.

The FMSD is organized into four programs:

- The Western Pacific Fishery Information Network (WPacFIN) is a cooperative program consisting of the WPacFIN central office at PIFSC and the fisheries agencies of the U.S. island areas in the Pacific. WPacFIN compiles fisheries information from this region and assists Pacific island agencies by providing the technical expertise and tools to collect fishery-dependent data needed to fulfill local and federal fishery management requirements.

- The Fisheries Monitoring and Analysis Program (FMAP) collects, processes, compiles, interprets, and disseminates federally mandated logbook data in support of fishery management. FMAP also provides information on federally regulated fisheries to fishermen and industry and makes available nonconfidential data to fishermen to improve PIFSC communication and working relationships with them.

- The Economics Program (EP) provides information on the contribution of Pacific Islands Region fisheries to the local and regional economies, on the value of living marine resources, and on the economic impacts of fisheries regulations.

- The Human Dimensions Research Program (HDRP) studies the "people" side of fishing and other uses of marine ecosystems in Hawaii, Guam, the Commonwealth of the Northern Marianas, and American Samoa. HDRP research complements biophysical and economic studies by exploring social and cultural benefits and values associated with marine resources.

FMSD has a staff of 21 people, including 8 federal employees and 13 JIMAR employees. The graph shows the distribution of expenditures across cost categories. Staff salaries and benefits made up the largest fraction of expenditures in FY 2005.

Key FY 2005 Accomplishments

Many of the products provided by FMSD are recurrent. Examples are the quarterly and annual summaries of logbook statistics for the longline fisheries in Hawaii and American Samoa, sections of the annual reports of several Fishery Management Plans, inputs to the annual *Fisheries of the United States* report, and others. Some new initiatives in FY 2005 included the following:

Fisheries Monitoring and Socioeconomics Division staff

- Provided vital technical support and software development to local fishery offices that resulted in the development of four new data collection and reporting efforts: shoreline-based creel survey program (CNMI and American Samoa); community-based fishermen reporting program (Guam); Council Coral Reef Plan Team Report; and independent coral reef biological sampled data (American Samoa and Guam).

- Provided data and analysis for monitoring the U.S. Pacific longline fishery catch of bigeye tuna east of 150° W longitude, fulfilling U.S. responsibilities to track and report the U.S. catch against the annual quota for the U.S. fleet established by the Inter-American Tropical Tuna Commission (IATTC).

- Established a long-term economic data collection program in the Hawaii longline fishery.

- Published a paper in Fisheries Research on the economic contribution of Hawaii longline fisheries and the effects of regulations on the longline fishery.

- Developed an economic analysis and cost-earnings study of the NWHI bottomfish fishery.

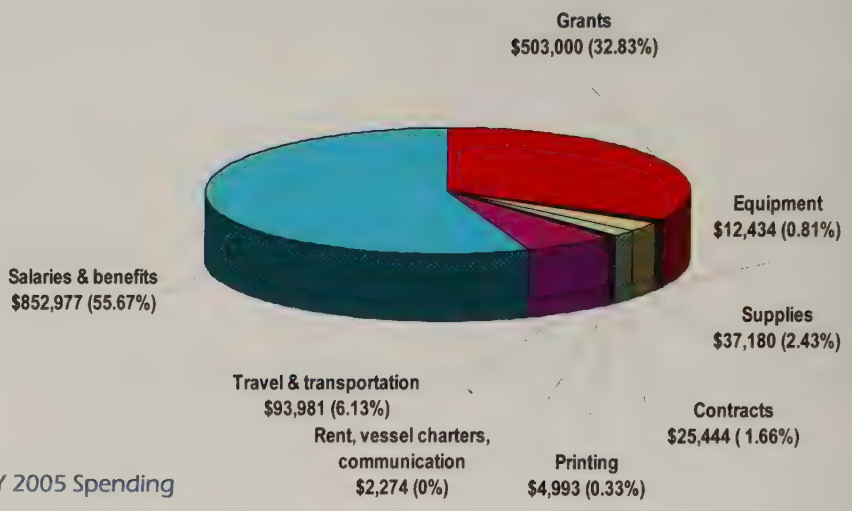
- Prepared a paper on the historical perspective of economic research in the NWHI, to be published in the Proceedings of the 3rd NWHI Scientific Symposium.

- Prepared a quantitative measurement of fishing capacity in the Western Pacific Region that was submitted to the NMFS National Excess Capacity Task Force as part of a national report on excess fishing capacity.

- Developed a series of reports analyzing the results of interviews with longline vessel owners, operators, and crew. Three were submitted for publication as NOAA technical memoranda and two as peer-reviewed publications.

- Presented a paper on a study describing social, cultural, and economic conditions and fishing activity in each of several Pacific Island fishing communities at the annual conference of the Society for Applied Anthropology.

- Hosted a workshop to develop and report recommendations for the Hawaii Marine Recreational Fishing Statistical Survey (HMRFSS) as a means to collect marine recreational fishing data and related information.



FMSD FY 2005 Spending

Challenges, Problems, Limitations

The FMSD must meet increasing demand for more and better fishery data to help the agency comply with statutory and regulatory provisions (e.g., Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Endangered Species Act.) To meet this demand, the FMSD must invest in expanding the PIFSC staff; ensure adequate technical training; build greater technical capacity in the Pacific Islands; take advantage of technology that increases the efficiency of data operations and improves the timeliness of reporting; and complete the development of comprehensive metadata and documentation for fishery data collections and reports. In addition, the FMSD seeks to fill several key staff positions that will provide needed expertise in fishery biology, data management, and economics.

Future Focus and Direction

WPacFIN will continue to improve all long-term data collection programs and address new developments that may arise. Key efforts will include working closely with partner offices throughout the Pacific Islands Region to identify ways to improve data collection and coverage and help local fishery offices implement new

monitoring programs. WPacFIN also plans to develop new database applications in several areas: Import and Local Boat Registration data collection; integration of Hawaii Division of Aquatic Resources fishermen catch data with Hawaii state fish dealer sales data; and capture data on local boats and fish imports in CNMI and American Samoa. WPacFIN also plans to improve documentation of data collection programs, database applications, Web site updates, and data request protocols.

FMAP plans to provide scientific and technical support for regulations that allow the implementation of simpler and more efficient reporting alternatives for logbooks and other required data collection, such as increasing the use of electronic longline logbooks. FMAP also intends to move towards alternative data collection methods by moving to real-time data collection. FMAP also plans to develop applications that integrate data from different data sets, produce outputs needed to fulfill U.S. data reporting obligations to international fisheries management bodies, and automate report generation. FMAP will also improve its section of the PIFSC Web site to make it more interactive and user friendly so that the public can get ready access to nonconfidential information.

The EP seeks to extend its geographical coverage to American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. EP also would like to expand its research in coral reef resources, protected species, and ecotourism.

WPacFIN provides technology training to staff of partner agencies

HDRP plans two new projects in the near future: a study that estimates the nonmarket values of blue marlin to recreational anglers and then compares these values to commercial catch values; and a project to develop a framework for long-term monitoring of the human dimensions of coral reef ecosystems in the main Hawaiian Islands.

Research
Protected Species Division

The Protected Species Division (PSD) conducts research supporting the recovery and sustainability of protected species populations in the Pacific Islands Region (PIR), notably the Hawaiian monk seal and Pacific sea turtles. The division is expanding with a new research program to address growing needs for information on cetacean populations in the PIR. Current activities by the PSD include studies using advanced technologies such as CRITTERCAM, passive acoustic monitoring systems; archival electronic tags; analysis of fatty acid profiles for diet studies; research on post-hooking mortality of sea turtles; studies of sea turtle ecology and migration; stock assessments of turtles and marine mammals; and health and disease research.

The Division is organized into three programs:

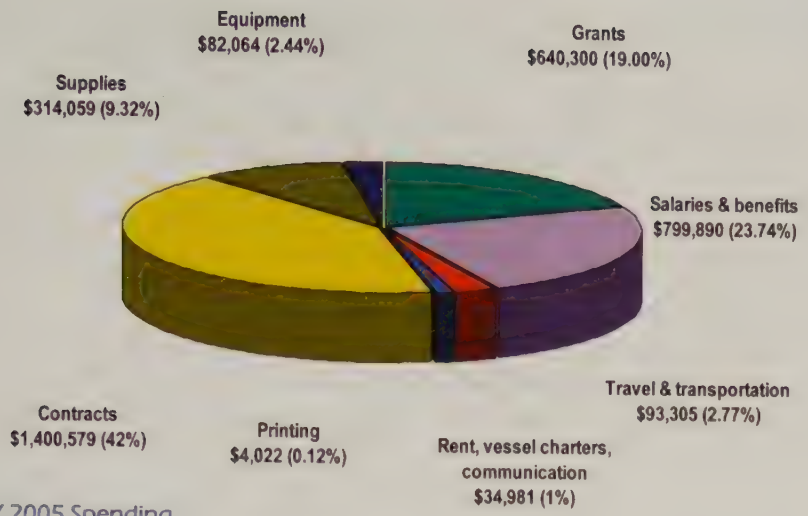
- Marine Mammal Research Program (MMRP) This program conducts research on the population biology and stock status of Hawaiian monk seals and central and western Pacific cetaceans (whales and dolphins). The monk seal research is executed by three subprograms dealing with stock assessment, monk seal foraging ecology, and monk seal health and disease.
- Marine Turtle Research Program (MTRP) This program conducts comprehensive research on the Hawaii green turtle population, including: field studies of growth rates, mortality, and movements; long-term monitoring of abundance trends including annual surveys of the nesting colony at East Island, French Frigate Shoals; and the biology, etiology, and impacts of fibropapilloma disease. The program also trains Pacific islanders and fishery observers in sea turtle biology and handling, collects data on fishery interactions with sea turtles, and studies the pelagic biology of sea turtles in the Pacific.
- Marine Turtle Assessment Program (MTAP) This program studies the distribution, abundance, vital rates, and population trends of sea turtles in the PIR.

PSD has a total staff of 26 people, including12 federal employees and 14 employees of JIMAR or other non-federal entities. The distribution of expenditures across cost categories is shown in the accompanying graph. Contracts to veterinarians and other specialists accounted for the largest share of expenditures in FY 2005.

Key FY 2005 Accomplishments

- Completed the 2004 Stock Assessment Report for monk seals using new capture-recapture methodology to estimate total abundance of monk seal subpopulations.
- Created topographic models of the Northwestern Hawaiian Islands (NWHI) to evaluate potential effects of sea-level rise on monk seal habitat.
- Deployed high-frequency acoustic recording packages (HARPs) on the seafloor at Cross Seamount and Palmyra Island to record cetacean sounds and enable monitoring and analysis of cetaceans at these locations.
- Convened a workshop to develop a comprehensive cetacean research plan for the PIR.

Protected Species Division staff



PSD FY 2005 Spending

- Published results of an analysis of monk seal CRITTERCAM data.
- Convened the Second Hawaiian Monk Seal Foraging Research Workshop.
- Assessed the impact on sea turtle populations of the Hawaii-based, deep-set longline fishery by using the Dennis-Holmes extinction model, thus supporting the Pacific Islands Regional Office in developing the Biological Opinion for turtle takes in the Hawaii longline fishery.
- Published a paper analyzing a 32-year time series of nesting abundance data for Hawaiian green turtles.
- Published a paper analyzing the effect of fibropapillomatosis on the somatic growth dynamics of green turtles resident in the foraging grounds at Pala'au, Molokai.
- Released 40 juvenile loggerhead turtles fitted with satellite-linked tags to study their foraging behavior in the North Pacific. The results identified the Kuroshio Extension Bifurcation Region as an important loggerhead turtle foraging habitat.

Challenges, Problems, Limitations

Although the Protected Species Division had a very productive year, it was not without challenges. Research progress was hampered by logistical and bureaucratic difficulties in retaining trained and skilled leaders for NWHI field camps and in ensuring access to remote research sites. An ongoing challenge is enhancing the recovery of the endangered Hawaiian monk seal by identifying and mitigating factors inhibiting its recovery, such as marine debris, aggression by adult male seals, and shark predation. As the Division expands its sea turtle and cetacean research activities, a new challenge will be to identify research techniques and methodologies that can efficiently survey the vast area of the PIR inhabited by these animals.

Future Directions

Key goals for FY 2006 will be to maintain the long-term collection of monk seal data in the NWHI; to initiate projects to improve the survival of juvenile monk seals; and to expand the monitoring program into the main Hawaiian Islands (MHI), where the monk seal population is increasing and human contact with seals is becoming more frequent. Another key goal will be to continue to develop and implement the cetacean research program, including such projects as analyzing cetacean sound data from acoustic recorders and identifying spinner dolphin resting habitat. In addition, PSD seeks to expand its marine turtle research in American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands while continuing to assess the status of marine turtle populations that forage in the central North Pacific but nest outside the United States (e.g. leatherbacks, loggerheads and olive ridleys).

A monk seal researcher sets up a remote field camp

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